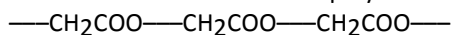


T20D02 – 20.1-20.4 IB Practice

Name.....

1. The first synthetic thread was made from a polyester. A section of the polyester is drawn below:



- (i) Give the structural formula of the monomer (containing two functional groups) that could be used to make this polyester and state the names of the two functional groups.

(3)

- (ii) State, giving a reason, whether this polyester is made by a condensation reaction or an addition reaction.

(2)

(Total 5 marks)

2. (i) Ethanoic acid reacts with ethanol in the presence of concentrated sulfuric acid and heat. Identify the type of reaction that takes place. Write an equation for the reaction, name the organic product formed and draw its structure.

(4)

- (ii) State and explain the role of sulfuric acid in this reaction.

(2)

- (iii) State **one** major commercial use of the organic product from this type of reaction.

(1)

(Total 7 marks)

3. Hexanedioic acid and 1,6-diaminohexane react together to form a synthetic polymer. There are many natural polymers, some of the most familiar being proteins formed from 2-amino acids.

- (i) Give the structural formula of each monomer in the synthetic polymer.

(2)

- (ii) State the type of polymerization reaction that occurs between these two monomers and identify the structural feature needed in the monomers.

(2)

- (iii) Draw the structure of and state the type of linkage formed in this polymer, and identify the other product of this polymerization reaction.

(3)

- (iv) The structures of some 2-amino acids are shown in Table 20 of the Data Booklet. Using alanine as an example, explain what is meant by the term *optical activity*, identify the structural feature that needs to be present and illustrate your answer with suitable diagrams of both isomers.

(3)

- (v) Identify a 2-amino acid from Table 20 which does **not** show optical activity.

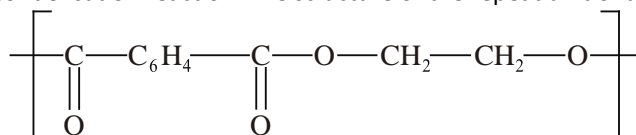
(1)

- (vi) Polyesters are formed in a similar polymerization reaction to proteins. Their monomers are esters. State **one** use of esters and identify the **two** compounds that react together to form the ester ethyl methanoate.

(3)

(Total 14 marks)

4. Polyesters are formed in a condensation reaction. The structure of the repeat unit of a polyester is



- (i) Draw the structures of the two monomers that react to form this polyester.

(2)

- (ii) Identify the essential feature of the monomers in (i) that enable them to form a condensation polymer.

(1)

(Total 3 marks)